Discussion

Sugar City is located at the estern edge of the Snake River Plain in Madison County, Idaho. During the summer of 1977 the U.S. Geological Survey, in cooperation with the U.S. Department of Energy, conducted an extensive geophysical and geological investigation in the following areas: Sugar City, Rexburg, and Rexburg bench area southeast of Sugar City (Mabey, 1978; Zohdy and others, 1978; and Prostka and Embree, 1978). This study, complemented by previous regional geologic mapping of Prostka and Hackman (1974), suggests that a large, Pliocene caldera complex is centered in the Rexburg-Sugar City area.

From June 12 to August 11, 1978, the U.S. Department of Energy drilled a geological exploration well in the city park, at the southwest corner of Sugar City (SW1/4 SW1/4 ec. 4, T. 6 N., R. 40 E.). The drilling program was designed to answer questions regarding the structure and stratigraphy along the margin of this part of the eastern Snake River Plain, to verify the existence of the Rexburg caldera complex, and to collect local heat flow data.

More than 600 m of rhyolitic lava flows and tuffs in this well suggest a local rhyolitic source and therefore substantiates the existence of part of the Rexburg caldera complex beneath the Snake River Plain basalts and sediments in this area.

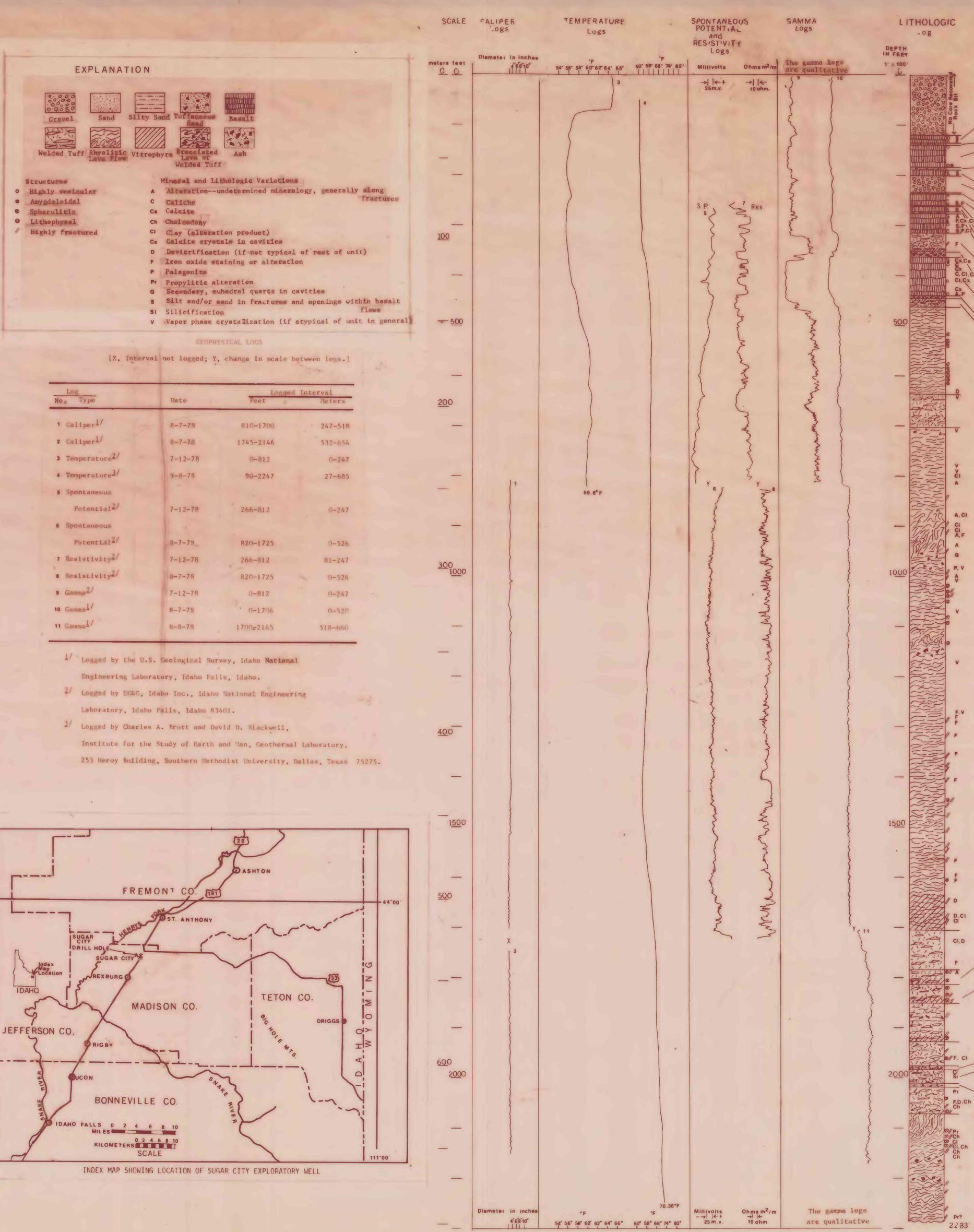
REFERENCES

Christiansen, R. L., and Blank, H. R., Jr., 1972, Volcanic stratigraphy of the Quaternary rhyolite plateau in Yellowstone National Park: U.S. Geological Survey Professional Paper 729-B, B1-B18. Mabey, D. R., 1978, Gravity and Aeromagnetic Anomalies in the Rexburg

Area of Eastern Idaho: U.S. Geological Survey Open-File Report 78-382, 19 p. Prostka, H. J., and Proree, G. F., 1978, Geology and geothermal

resources of the Rexburg area, eastern Idaho: U.S. Geological Survey Open-Fil Report 78-1009, 14 p. Prostka, H. J., and Hackman, R. J., 1974, Preliminary geologic map of the NW 1/4 Driggs 1° by 2° quadrangle, southeastern Idaho: U.S.

Geological Survey Open-File Report 74-105, scale 1:125,000. Johdy, A. A. R., Bisdorf, R. J., and Jackson, D. B., 1978, Simple Total Field and Schlumberger Soundings near Sugar City, Idaho: U.S. Geological Survey Open-File Report 78-709.



Gravel: Well-rounded pebbles and cobbles of analt, quartzite, granite, schist, and gneiss

Basalt: Medium gray, aphanitic, with <1 percent phenocrysts of

plagioclase (as much as 1 cm) and olivine. Highly vesicular top; red, plansy, vesicular base Pebbly arkosic sand: Red, fine to medium grained, subangular to rounded, with <1 percent pebbles

-Basalt: Fine grained, diktytaxitic, with olivine phenocrysts varying from 5 to 15 percent. Small vesicular diabasic dike at 160 ft (48.7 m) Turfaceous sand: Light-gray to grayish-pink mixture of very fine sand

and ash with 1-5 mm pumices. Occasional coarse to very coarse and grains at the top Basalt: Black, vesicular, with 1 percent oliving phenocrysts; possible pillow structure at base Gravel: Clasts of quartzite, rhyolite (including Huckleberry Ridge Tuff), basalt, obsidian, sandstone,

and granite ranging from 3 to 5 cm, in matrix of very ine, subangular silty sand
Silty clay and sand: Light brown, laminated, poorly indurated, silty clay; grades down into fine-grained, subrounded sand Basalt: Aphanitic to fine grained, with sparse oliving phenocry to Bottom 3 m contains palaponite, very fine angular sand, and some pebble Sand: Well-sorted, very fine, subangular sand

Basalt: Aphanitic with occasional 5 mm plagioclase phenocrysts. Very fine silty sand filling fractures Sand: Red, medium grained, subangular to subrounded, silty
Basalt: Vesicular with 1 percent plagioclase and olivine phenocrysts (3-4 mm). Possible flow break marked by changes

in vesicularity, increase in glass content, and intermingled sand and pelagonite(?) at 298-304 ft (90.8-92.6 m)
Huckleberry Ridge Tuff: Pink, devitrified, eutaxitic, crystal-rich (10-30 percent), welded ash-flow tuff containing phenocrysts of quartz, sanidine, and plagioclase; and 3-4 cm flattened pumices.

Ash: Slightly welded(?), fine ash with as much as 25 percent pumice fragments (<2 cm) and <5 percent phenocrysts of quartz and feldspar Basalt: Vesicular, aphanitic to locally diktytaxitic, with 1-5 percent small (<1 mm) olivine phenocrysts and 1 percent plagioclase phenocrysts (3-5 mm). About 30 cm of dark-red ci ders at base. Suspected flow unit breaks marked by changes in vesicularity occur at 374 ft (114.0 m) and 393 ft (119.8 m)

Sandy ash: Very fine to medium sand and reworked ash with pumice clast Welded tuff: Red, devitrified, poorly welded, with 5-10 percent phenocrysts of quartz and feldspar

Rhyolitic lava flow: Black to medium gray, perlitic and vitrophyric, with 5 percent phenocrysts of plagioclase, anidine, and clinopyroxene. Local flow bonding, spherulitic zones, and devitrified zones. Spherulites as much as 6 cm

Welded tuff: Very fine to fine grained, moderately welded, with 2 percent sanidine and 1 percent quartz phenocrysts 2-3 mm in size and occasional pumice fragments. Considerable vapor-phase crystallization near the top

Rhyolitic lava flow: Dark gray and white to pink, flow-banded, very fine grained and devitrified, with 1-5 percent phenocrysts of sanidine, plagioclase, clinopyroxene, and quartz. Plagioclase and sanidine dominate in approximately equal amounts. Clinopyroxene phenocrysts vary from trace amounts to 1. percent commonly having reaction rims of biotite and magnetite (?). Quartz phenocrysts are sparse and generally small. Considerable vapor-phase crystallization of crystobalite and alkali feldspar(?) has occurred in voids parallel to flow bands. Flow banding is locally quite contorted and brecciation has occurred locally. The bottom 20-25 m of the flow consists of black perlitic vitrophyre with some devitrified layers and local evidence of pumice and shard (?) structure

Welded tuff: Buff to orange, slightly eutaxitic, devitrified, moderately welded, with phenocrysts of embayed sanidine (3 percent) and plagioclase (2 percent), and white to red-brown pumice fragments as much as 2 cm in size

Welded tuff: Pale reddish brown, devitrified, nonwelded to moderately welded, with 5-10 percent broken phenocrysts of sanidine, quartz, and plagioclase. Pumice framents are few (< 5 percent) and small (< 5mm). Bottom 3 m consists of red-brown and black vitrophyre

Welded tuff: Red, partially devitrified, eutaxitic, moderately to densly welded, with 10-15 percent phenocrysts and as much as 70 percent pumice fragments 3 cm in diameter. Phenocrysts include sanidine (5-7 percent), quart (3-5 percent), plan oclase (2-3 percent), and clinopyroxene (trace)

Welded tuff: Red, flow banded(?) and brecciated to eutaxitic, with phenocrysts of feldspar (8 percent) and quartz (2 percent)

Welded tuff: Black and red, highly fractured, densely welded, with 5 percent lithic fragments

6 mm in diameter. Local green (nontronite ?) fracture filling Ash: Slightly reworked, with 10 percent quartz grains, 2 percent iron oxide grains, and subangular pumice clasts Welded tuff: Red brown, pumice rich, devitrified, moderately welded, with phenocryst of sanidine (5 percent), plagioclase (3 percent), quartz (2 percent), and clinopyroxene (trace). Pumices (1-1.5 cm) locally comprise as much as 40 percent

of rock. Tuff locally silicified Ash: Reworked, with 5-30 percent crystals of quartz and feldspar F.D.Ch Welded tuff: Red to green, locally propylitized, moderately welded, with phenocrysts of sanidine (4 percent) and plagioclase (1

Rhyolitic lava flow: Reddish orange, very fine grained, flow-banded, with <1 percent phenocrysts of plagioclase, sanidine, quartz, and oxidized mafic minerals. Local propylitic alteration, chalcedony veins, and spherulitic zones with spherulites up to 3 cm in diameter. Some vapor-phase crystallication along fractures

DRILLING DATA FROM SUGAR CITY EXPLORATION WELL, MADISON COUNTY, IDAHO

 $0^{\circ}C = 5/9 \ (^{\circ}F-32^{\circ})$ 1 in. = 2.54 cm 1 ft. = 0.3048 m